

What is claimed is:

1. A multiple laser diagnostic apparatus, comprising:
  - (a) n lasers, wherein said n > 1 and each of said n lasers simultaneously delivers a laser diagnostic beam selected for a diagnosis using fluorescence emission wherein each one of said laser diagnostic beam comprises at least one different laser beam parameter; and
  - (b) means to deliver said laser diagnostic beams in a combined treatment beam wherein said combined diagnostic beam is delivered at a substance at which said substance undergoes said fluorescence emission.
2. The apparatus as set forth in claim 1, wherein said laser beam parameters are wavelengths, fluences, power levels, energy levels, temporal parameters, geometrical parameters, spot sizes, linear delivery parameters or three-dimensional delivery parameters.
3. The apparatus as set forth in claim 2, wherein said wavelength is selected from a spectrum of wavelengths ranging from ultraviolet to far infrared.
4. The apparatus as set forth in claim 2, wherein said one or more laser beam parameters of said laser diagnostic beams are different.

5. The apparatus as set forth in claim 2, wherein said one or more laser beam parameters of said laser diagnostic beams are identical.
6. The apparatus as set forth in claim 1, further comprising means to detect said fluorescence emission.
7. The apparatus as set forth in claim 1, further comprising means to analyze said detected fluorescence emission.
8. The apparatus as set forth in claim 1, further comprising means to display said diagnosis.
9. The apparatus as set forth in claim 1, wherein said means to deliver comprises means to detect said fluorescence emission.
10. The apparatus as set forth in claim 9, wherein said means to detect comprises a plurality of optical paths.
11. The apparatus as set forth in claim 10, wherein said optical paths are optical fibers, articulated arms or waveguides.
12. The apparatus as set forth in claim 10, wherein one or more of said plurality of optical paths are positioned to detect a substantially

uniform distribution of said fluorescence emission from said substance.

13. The apparatus as set forth in claim 1, further comprising at least one optical component to select one or more laser beam parameters of one or more of said laser diagnostic beams.
14. The apparatus as set forth in claim 13, wherein said optical component is a beam profiler, a collimator, a spherical element, an a-spherical element or a parabolic element.
15. The apparatus as set forth in claim 1, further comprising means to control each one of said n lasers.
16. The apparatus as set forth in claim 15, wherein said means to control comprises a single control panel.
17. The apparatus as set forth in claim 1, further comprising means to control one or more laser beam parameters of at least one of said laser diagnostic beams.
18. The apparatus as set forth in claim 1, wherein one or more of said n lasers is a gas laser, liquid laser, solid state laser, semiconductor diode laser, a tunable laser or a flashlight laser.

19. The apparatus as set forth in claim 1, wherein said means to deliver comprises a mirror-based optical delivery system to control said combined diagnostic beam.

20. The apparatus as set forth in claim 19, wherein said mirror-based optical delivery system has a spot size of 0.1 mm or less.

21. The apparatus as set forth in claim 19, wherein said mirror-based optical delivery device has a spot size of 0.1 mm or more.

22. The apparatus as set forth in claim 19, wherein said optical delivery device comprises linear delivery means.

23. The apparatus as set forth in claim 19, wherein said optical delivery device comprises three-dimensional delivery means.

24. The apparatus as set forth in claim 1, wherein said means to deliver comprises a micromanipulator.

25. The apparatus as set forth in claim 1, wherein said means to deliver comprises endoscopic delivery means.

26. The apparatus as set forth in claim 1, wherein said means to deliver comprises an optical device wherein said optical device comprising:

(a) n optical components aligned on an optical path to receive said laser diagnostic beams from said n lasers, wherein said laser  $n_i$  corresponds to said optical component  $n_i$  and  $i=1,\dots,n$ , and wherein each of said n optical components directs and selectively combines said laser diagnostic beams of said n lasers along said optical path; and

(b) an optical delivery system connected to said optical path to deliver said combined diagnostic beam to said substance.

27. The apparatus as set forth in claim 26, wherein one or more of said n optical components is a wavelength selective mirror, a beam splitter or a wavelength selective filter.

28. The apparatus as set forth in claim 26, further comprising means to position said n optical components in said optical path or away from said optical path.

29. The apparatus as set forth in claim 26, further comprising position means to generate a subset of combinations of said laser diagnostic beams.

30. The apparatus as set forth in claim 1, further comprising means to enhance said fluorescence emission.

31. The apparatus as set forth in claim 30, wherein said means to enhance said fluorescence emission comprises an agent, a dye, a metallic particle or a fluorescent probe.

32. The apparatus as set forth in claim 1, wherein said substance is a biological tissue, a food, a fluid, a chemical compound, a biochemical compound, a bioengineering composition or a physical structure.

33. The apparatus as set forth in claim 1, wherein said diagnosis is a medical diagnosis and said laser diagnostic beams are medically useful diagnostic beams.

34. The apparatus as set forth in claim 1, further comprising means for treating said substance.

35. The apparatus as set forth in claim 34, wherein said means for treating said substance comprises a multiple laser treatment apparatus for simultaneous delivery of two or more laser treatment beams at said substance wherein each one of said laser treatment beams comprises at least one different laser beam parameter.

36. The apparatus as set forth in claim 1, wherein said apparatus is a handheld delivery apparatus.

37. The apparatus as set forth in claim 1, wherein said handheld delivery apparatus is a portable and transferable miniature handheld delivery apparatus with dimensions of 6" by 12" by 20" or less.

38. The apparatus as set forth in claim 1, wherein said apparatus operates on independent power.

39. A multiple laser diagnostic apparatus, comprising:

- (a) means to select two or more laser diagnostic beams selected for a diagnosis using fluorescence emission wherein each one of said laser diagnostic beams comprises at least one different laser beam parameter; and
- (b) means to simultaneously deliver said laser diagnostic beams in a combined laser diagnostic beam at a substance at which said substance undergoes said fluorescence emission.

40. The apparatus as set forth in claim 39, wherein said laser beam parameters are wavelengths, fluences, power levels, energy levels, temporal parameters, geometrical parameters, spot sizes, linear delivery parameters or three-dimensional delivery parameters.

41. The apparatus as set forth in claim 39, further comprising means to detect said fluorescence emission.

42. The apparatus as set forth in claim 39, further comprising means to analyze said detected fluorescence emission.

43. The apparatus as set forth in claim 39, further comprising means to display said diagnosis.

44. The apparatus as set forth in claim 39, wherein said means to deliver comprises means to detect said fluorescence emission.

45. The apparatus as set forth in claim 44, wherein said means to detect comprises a plurality of optical paths.

46. The apparatus as set forth in claim 45, wherein said optical paths are optical fibers, articulated arms or waveguides.

47. The apparatus as set forth in claim 45, wherein one or more of said plurality of optical paths are positioned to detect a substantially uniform distribution of said fluorescence emission from said substance.

48. The apparatus as set forth in claim 39, wherein said means to select comprises at least one optical component to select one or more of said laser beam parameters of one or more of said laser diagnostic beams.

49. The apparatus as set forth in claim 39, wherein said means to select comprises means to control said laser diagnostic beams.

50. The apparatus as set forth in claim 39, wherein said means to deliver comprises a mirror-based optical delivery system to control said combined diagnostic beam.

51. The apparatus as set forth in claim 50, wherein said mirror-based optical delivery system has a spot size of 0.1 mm or less.

52. The apparatus as set forth in claim 50, wherein said mirror-based optical delivery device has a spot size of 0.1 mm or more.

53. The apparatus as set forth in claim 50, wherein said optical delivery device comprises linear delivery means.

54. The apparatus as set forth in claim 50, wherein said optical delivery device comprises three-dimensional delivery means.

55. The apparatus as set forth in claim 39, wherein said means to deliver comprises a micromanipulator.

56. The apparatus as set forth in claim 39, wherein said means to deliver comprises endoscopic delivery means.

57. The apparatus as set forth in claim 39, wherein said means to deliver comprises an optical device to combine said laser diagnostic beams.

58. The apparatus as set forth in claim 39, further comprising means for treating said substance.

59. The apparatus as set forth in claim 39, further comprising means for enhancing said fluorescence emission.

60. A method for diagnosing a substance, comprising the steps of:

- selecting two or more laser diagnostic beams selected for a diagnosis using fluorescence emission wherein each one of said laser diagnostic beams comprises at least one different laser beam parameter; and
- simultaneously delivering said laser diagnostic beams in a combined laser diagnostic beam at a substance at which said substance undergoes said fluorescence emission.

61. The method as set forth in claim 60, wherein said laser beam parameters are wavelengths, fluences, power levels, energy levels, temporal parameters, geometrical parameters, spot sizes, linear delivery parameters or three-dimensional delivery parameters.

62. The method as set forth in claim 60, wherein said step of selecting comprises the step of providing means to detect said fluorescence emission.

63. The method as set forth in claim 60, further comprising means to analyze said detected fluorescence emission.

64. The method as set forth in claim 60, further comprising means to display said diagnosis.

65. The method as set forth in claim 60, wherein said step of delivering comprises means to detect said fluorescence emission.

66. The method as set forth in claim 65, wherein said means to detect comprises a plurality of optical paths.

67. The method as set forth in claim 66, wherein said optical paths are optical fibers, articulated arms or waveguides.

68. The method as set forth in claim 66, further comprising the step of positioning one or more of said plurality of optical paths to detect a substantially uniform distribution of said fluorescence emission from said substance.

69. The method as set forth in claim 60, wherein said step of selecting comprises the step of providing at least one optical component to select one or more of said laser beam parameters of one or more of said laser diagnostic beams.

70. The method as set forth in claim 60, wherein said step of selecting comprises means to control said laser diagnostic beams.

71. The method as set forth in claim 60, wherein said step of delivering comprises the step of providing a mirror-based optical delivery system to control said combined diagnostic beam.

72. The method as set forth in claim 71, wherein said mirror-based optical delivery system has a spot size of 0.1 mm or less.

73. The method as set forth in claim 71, wherein said mirror-based optical delivery device has a spot size of 0.1 mm or more.

74. The method as set forth in claim 71, wherein said optical delivery device comprises linear delivery means.

75. The method as set forth in claim 71, wherein said optical delivery device comprises three-dimensional delivery means.

76. The method as set forth in claim 60, wherein said step of delivering comprises the step of providing a micromanipulator.

77. The method as set forth in claim 60, wherein said step of delivering comprises the step of providing endoscopic delivery means.

78. The method as set forth in claim 60, wherein said step of delivering comprises the step of providing an optical device to combine said laser diagnostic beams.

79. The method as set forth in claim 60, further comprising the step of providing means for treating said substance.

80. The method as set forth in claim 60, further comprising the step of providing means for enhancing said fluorescence emission.

81. A computer program to manage and control a simultaneous delivery of multiple laser diagnostic beams to a substance, comprising:

- (a) means for selecting a diagnostic plan wherein said diagnostic plan comprises two or more laser diagnostic beams wherein each one of said laser diagnostic beams comprises at least one different laser beam parameter; and
- (b) means for applying said diagnostic plan to said substance.

82. The computer program as set forth in claim 81, wherein said means for selecting comprises means for recommending said diagnostic plan.

83. The computer program as set forth in claim 81, wherein said means for selecting comprises a database of diagnostic plans.

84. The computer program as set forth in claim 81, wherein said means for selecting comprises means for comparing said diagnostic plan with a previous diagnostic plan.

85. The computer program as set forth in claim 81, further comprising means for entering data.

86. The computer program as set forth in claim 85, wherein said data comprises patient data, diagnostic plan data, maps, or complaint or disease data.

87. The computer program as set forth in claim 81, further comprising means for verifying said diagnostic plan.

88. The computer program as set forth in claim 81, further comprising communication means to communicate information between said computer program and one or more remote stations.

89. The computer program as set forth in claim 81, further comprising means to create a map based on said detected fluorescence emission.

90. The computer program as set forth in claim 89, wherein said map is a two-dimensional map.

91. The computer program as set forth in claim 89, wherein said map is a three-dimensional map.

92. The computer program as set forth in claim 81, further comprising means to create a database.

93. The computer program as set forth in claim 81, further comprising means to diagnose said substance.

94. The computer program as set forth in claim 93, further comprising means to recommend a treatment for said diagnosed substance, wherein said treatment comprises a laser treatment or a pharmaceutical treatment.

95. A database of a plurality of laser diagnostic plans wherein two or more laser diagnostic beams are delivered simultaneously to a substance, comprising:

- (a) said plurality of diagnostic plans; and
- (b) said one or more laser beam parameters for each one of said diagnostic plans wherein each one of said laser diagnostic beams comprises at least one different laser beam parameter.

96. The database as set forth in claim 95, wherein said diagnostic plans are medical diagnostic plans, chemical diagnostic plans, biochemical diagnostic plans, bioengineering diagnostic plans or physical diagnostic plans.

97. The database as set forth in claim 95, further comprising substance-related information.

98. The database as set forth in claim 95, further comprising patient-related information.

99. The database as set forth in claim 95, further comprising fluorescence emission maps.